

# Effect of Human Activities on the Environment: Case Study of Oil Facilities Security Services in Nigeria

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**ABSTRACT:** This paper examined the impact of the activities of security men attached to oil facilities on the environment in Nigeria. Data were collected from two locations namely; Ahoda and Ewreni for the study. Findings show that between January and April 2023, a total of 335 vehicles were burned at both sites. Ahoda site had average values of particulate matter (PM<sub>10</sub> = 205.1 ug/m<sup>3</sup> and PM<sub>2.5</sub> = 199.9 ug/m<sup>3</sup>); NO<sub>2</sub> = 209.5 ug/m<sup>3</sup>; SO<sub>2</sub> = 244.2 ug/m<sup>3</sup>; CO = 19.14 mg/m<sup>3</sup>; average ambient temperature = 30.3 °C; and average relative humidity = 36.2 %. While; the air quality parameters show that Ewreni site had average values of Particulate Matter (PM<sub>10</sub> = 205.1 ug/m<sup>3</sup> and PM<sub>2.5</sub> = 182.4 ug/m<sup>3</sup>); NO<sub>2</sub> = 224.5 ug/m<sup>3</sup>; SO<sub>2</sub> = 254.3 ug/m<sup>3</sup>; CO = 17.13mg/m<sup>3</sup>; average ambient temperature = 29.9°C; and average relative humidity = 34.3 %. The burning process of a large amount of petroleum products by these security men releases a large amount of carbon dioxide, particulate matter, nitrogen oxides, and sulfur dioxide, which all contribute significantly to climate change, pose health risks to humans, and huge threats to the environment as well as economic losses. The high-level of these parameters in Ahoda and Ewreni sites are suggestive of high level of air pollution of the environment. This paper recommends: (1) the immediate end to the burning of the assets used for oil theft; and (2) Remediation actions should be carried out to correct impacted soils by the activities of the security men.

**KEYWORDS:** particulate matter; relative humidity; suggestive; pollutants; crude oil; climate change; average ambient temperature

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## 1.0 INTRODUCTION

The oil producing areas of the Niger Delta region of Nigeria have been faced with so much environmental problems caused by pollution arising from oil activities such as gas flaring, toxic fumes release, oil spillage, drill cuttings, drilling mud, fluids used in production and chemicals injected to control corrosion or to separate oil from water and general industrial waste. In the past three decades activities of theft has repeatedly caused unquantifiable havocs to human beings, assets and the environment in the region. Environmental decay and many human-health related problems have been attributed to the emission of huge amounts of CO<sub>2</sub>, HCs, CO, SOX, CFCs,

suspended PMs and NO<sub>x</sub>, which spread over 25km radius [1-2]. These greenhouse gases and air pollutants released into the environment mainly as a result of combustion of fossil fuels from various sources are responsible for respiratory and related diseases in humans, animals and the plant kingdom [1]. The health problems associated with the pollutants include bronchitis, asthma, human neurological disorders, etc., which result in increased premature deaths. Other notable concerns linked to these pollutants are acidification of lakes, streams and oceans (which negatively affect aquatic lives); soil acidification (which depletes soil nutrients that negatively affects

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agricultural productivity) and acid rains that cause harm to statues, monuments and buildings through increased weathering [1]. Acid rains are also very harmful to forests because when they seep into the ground, they dissolve nutrients, such as calcium and magnesium that help trees to be healthy;

Global warming enhances heat stress, diseases and severity of tropical storms, ocean acidity, sea water levels rise, the melting of glaciers, snow pack and sea ice. Air pollution increases the risk and chances of asthma, respiratory illness, cardiovascular disease, cancer, hospitalizations, emergency-room visits, lost work-days, and lost school-days [3-4] all of which decrease economic output, consume socio-economic resources and weaken the security of nations. Pneumonia and other lower respiratory infections (which largely stem from air pollution) are the deadliest group of communicable diseases and together ranked by [5] report as the fourth leading cause of death. According to the Global Burden of Disease (GBD, 2019), 78 per cent of the deaths caused by air pollution-related pneumonia in Nigeria were among children under the age of five- which was the highest record among all countries of the world. According to [6], 67,416 children under the age of five died in Nigeria as a result of pneumonia caused by air pollution in 2019. This number is expected to have risen appreciably due to increased unhealthy anthropogenic practices currently going on in the country. The results of the investigation conducted by the Federal Ministry of Environment and other regulatory bodies from 2009 to 2014 on the quality of outdoor air in Nigeria showed that the concentration of air pollutants namely CO, SO<sub>2</sub>, NO<sub>x</sub>, particulate matters and volatile organic compounds (VOCs) due to the burning of fuels and other industrial related processes are many times higher than the WHO standards [7] According to [5], the annual mean concentration of particulate matter (PM<sub>2.5</sub>) pollutant in Nigeria is 46.3 µg/m<sup>3</sup>, which is 9 times more than the WHO outdoor air quality standard. The report of the Air Quality Life Index (AQLI) of 2021 revealed that there is high likelihood that people resident in the Niger Delta area of Nigeria will lose about 6 years of life expectancy if the recent situation of air pollution around the region is not kept in check [8].

Since the discovery of oil in 1956 in Nigeria, the country has been suffering the negative environmental on sequences of oil exploration.

Oil spillages have occurred in various coastal areas. Frequent incidents of oil spill in Nigeria have continued to sabotage ecological protection efforts, as more than 6,000 cases of oil spills have been recorded in the last 40 years of crude oil exploitation, giving a yearly average of 150 spills, [9]. In Nigeria, the causes of oil spills have been identified as pipeline corrosion, tanker accidents, oil production operational errors, sabotage of pipelines mainly due activities of militants, mechanical systems failures, inadequate care in loading and unloading oil vessels [10-11]. Oil spills have degraded vast agricultural lands in the Niger Delta region and have turned hitherto productive areas into wastelands. Thus, with increasing soil infertility due to the destruction of soil micro-organisms and dwindling agricultural productivity, farmers have been forced to abandon their lands, and are forced to emigrate to other communities in search of livelihood, thereby exerting additional pressures on natural resources in such areas [11-12]. Aquatic lives have also been destroyed with the pollution of traditional fishing grounds, exacerbating hunger and poverty in fishing communities [13].

Oil spill can also occur naturally through natural disasters like hurricane and earthquake, movement of tectonic plate and inadequate trap system [14]. Oil spill affects the environment negatively. The most damaging and well documented effects of petroleum spillage are the oiling and tarring of beaches, death of seabird, and the destruction of intertidal marine communities [14]. The researchers listed the effects of climate change to include: persistent rise in environmental temperature; increased precipitation with higher likelihood of flooding; extreme storm events and persistent rise in sea level. The effects of natural gas flaring and petroleum spillages have also tainted the fish supply with toxins as well as the fruits and vegetables that are harvested from such polluted environment, thereby taking its toll on the health and well-being of the residents [15].

Furthermore, the last two years have witnessed yet another problem caused by the Federal security agencies, who use fire to burn down vehicles (articulated trucks and cars) and ocean vessels suspected to have been used for stealing crude oil and refined products, as well as unlicensed artisanal refineries across the Niger-Delta region, thereby exacerbating climate change problems.

This paper presents a study conducted in some areas of Niger Delta in Nigeria to investigate cases of burning of vehicles (suspected to have been used to carry out oil theft) by the Joint Security Task Forces (JTF). The objectives of this study is to (1) to determine the economic losses resulting from burning oil bunkering facilities, and (2) to determine the impact of the burnt facility on the environmental air quality; and (3) make recommendations for appropriate corrective actions. The outcome of this study will be beneficial to the inhabitants of the study areas and the world at large in the following way: (1) stop further pollution of the environmental air. (2) Stop destruction of animals and plants in the area. (3) Reduce discomfort of breathing in thick smoke and other air particles caused by the burning fossil oil.

## 2.0 MATERIALS AND METHODS

### 2.1. Geographical description of study locations/areas

Several sites across Nigeria are currently been used by the joint security task force for burning of vehicles and other assets allegedly used for crude oil and refined products theft. However, for the purpose of this study two of such sites namely Ahoda and Ewreni were selected. Ahoda has geographical coordinates of 5° 5' 0" North, 6° 39' 0" East and its original name (with diacritics) is Ahoada. Ahoada East has an estimated average temperature of 27 degrees Celsius with humidity of 88 percent. Ahoada region has two major seasons which are the dry and rainy seasons with the rainy season characterized by heavy and consistent rainfall. The other study area, Ewreni is a town in Ughelli North Local Government area of Delta State, Nigeria. Ewreni is a Clan made of communities (quarters). It is an oil-producing area, which has about 14 oil wells, glow and compressor stations operated by the Shell Petroleum Development Company of Nigeria, which produces about 15,000 barrels of crude oil daily. Ewreni is located at an elevation of 52 meters above sea level, its coordinates are 5°24'0" North and 6°4'0" East in DMS (Degrees Minutes Seconds) or 5.4 and 6.06667 (in decimal degrees). At Ewreni town, sun rises at about 08:00 and sets at about 18:00 local time (Africa/Lagos UTC/GMT+1). The standard time zone for Ewreni is UTC/GMT+1. Ewreni district has an average yearly temperature of 28.44°C (83.19°F) and it is -1.02% lower than Nigeria's averages. Ewreni typically receives

about 239.8 millimeters (9.44 inches) of precipitation yearly and has 294.05 rainy days (80.56% of the time) annually.

## 2.2 Materials

The following were used for the study: camera; calculator; field note; laptop; Aeroqual Series 500 – Portable Air Quality Monitor; Microsoft excel software; and pen.

## 2.3 Methods

The study was carried out using a five steps methodology proposed by Adigio and Ohwofadjeke [16]. Intensive literature search was carried out to identify and completely define research problem/needs that necessitated the study.

### 2.2. Data Collection

Frequent site visits were made to two of the sites that are being used by the federal security forces for burning (destruction) of trucks/vehicles used by suspected oil theft. The selected sites are located at Ahoda in Rivers State and Ewreni in Delta State respectively, both in Nigeria. Frequent field trips were made for the months of January; February, March; and April 2023. Personal interviews of host community inhabitants and frequent field visits were explored to gather required data. Collected data of burnt vehicles are presented in Tables 1 and 2; and Figures 1 and 2.

Whiles, air quality parameter like: Carbon Monoxide (CO), Nitrogen Dioxide (NO<sub>2</sub>), Ozone (O<sub>3</sub>), Sulphur Dioxide (SO<sub>2</sub>), particulate matter (PM<sub>10</sub> & PM<sub>2.5</sub>) were measured using Aeroqual Series 500 – Portable Air Quality Monitor every 24 hours at 9.00 am daily for seven days to ascertain the air pollutants level of the environment been used for the destruction oil bunkering facilities (including trucks, buses and cars).

## 2.3: Data analysis

### 2.3.1: Analysis Data of Burnt Vehicles

Data of Burnt Vehicles collected in section 2.2 were analyzed using simple statistics and present in section 3.1.

### 2.3.2: Analysis Data of Air Quality

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The data collected in section 2.2 were analyzed using Air Quality Index (AQI) formula given in equation 1.

$$AQI = \frac{(AQI_{Hi}) - (AQI_{Lo})}{(Conc_{Hi}) - (Conc_{Lo})} \times ((Conc_i) - (Conc_{Lo})) + (AQI_{Lo}) \quad [1]$$

Where; Conc<sub>i</sub> = Input concentration for a given pollutant

Conc<sub>Lo</sub> = the concentration breakpoint that is less than or equal to Conc<sub>i</sub>

Conc<sub>Hi</sub> = the concentration breakpoint that is greater than or equal to Conc<sub>i</sub>

AQI<sub>Lo</sub> = The AQI value/breakpoint corresponding to Conc<sub>Lo</sub>

AQI<sub>Hi</sub>= The AQI value/breakpoint corresponding to Conc<sub>Hi</sub>

Air quality data of Ahoda site is presented in Table in 3, while air quality data of Evwreni site is presented in Table in 4.

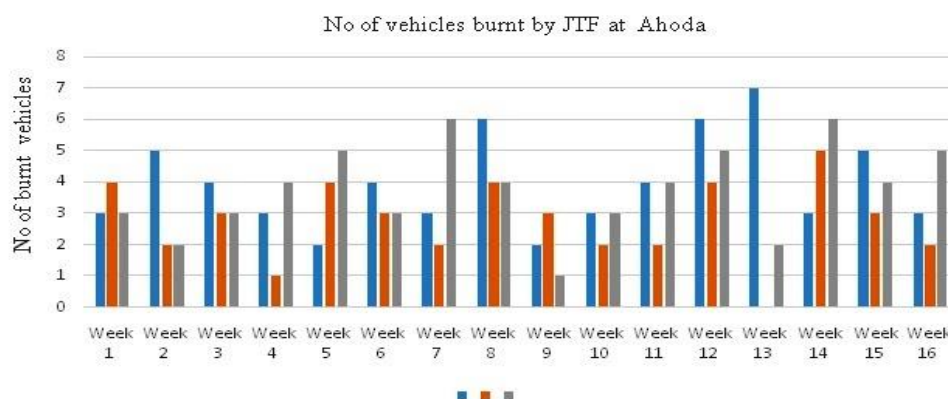
### 3.0: RESULTS AND DISCUSSION

#### 3.1 Results of Analysis of Burnt Vehicles

Data collected are presented in Tables 1 and 2 and photographs of devastated sites were taken and shown in plates 1 to 10 in addition to collection of other relevant data for the study. Data classification and analysis were carried out using simple statistics with Microsoft Excel.

**Table 1 Data of vehicles burnt by the Joint security task force JTF between January and April 2023 at Ahoda Site**

Ahoda Site			
WEEK/YEAR	Heavy duty tanker	Medium Tankers/truck	Cars
Week 1 2023	5	2	1
Week 2 2023	6	3	4
Week 3 2023	3	4	2
Week 4 2023	6	5	3
Week 5 2023	3	0	2
Week 6 2023	4	4	3
Week 7 2023	5	3	5
Week 8 2023	3	1	4
Week 9 2023	6	3	2
Week 10 2023	3	4	1
Week 11 2023	5	3	2
Week 12 2023	2	5	5
Week 13 2023	4	3	2
Week 14 2023	5	1	4
Week 15 2023	4	3	6
Week 16 2023	5	7	2
<b>Total</b>	<b>69</b>	<b>51</b>	<b>48</b>



**Figure 1 Vehicles burnt by JTF between January and April 2023 at Ahoda Site**

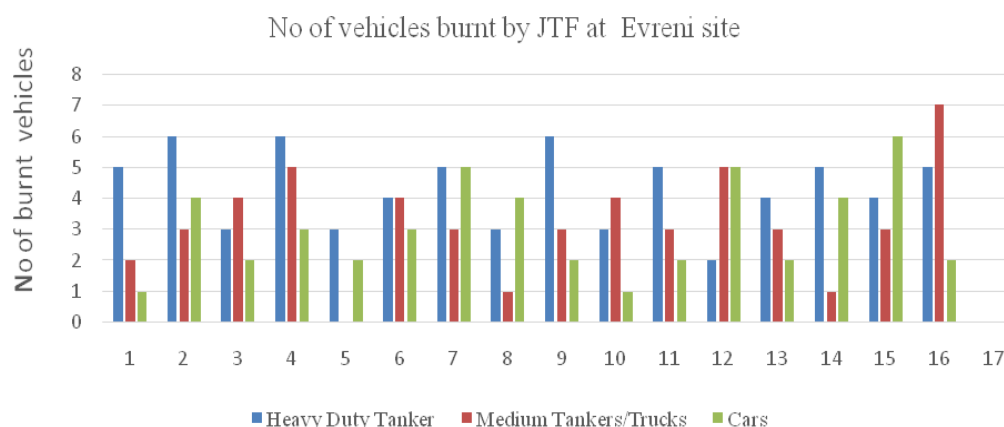
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From the results presented in Tables 1 and 2, the Joint Security Task Force (JTF) continued to burn vehicles that have been allegedly used for oil theft. The data presented in Table 1 and Figure 1, showed that between January and April 2023; the JTF succeeded in burning a total of 168 vehicles in Ahoda site, comprising 69 heavy duty tankers (each of the burnt tankers

has carrying capacity ranging from 33,000 to 45,000 litres); 51 medium tankers/trucks (each ranging from 9,000 to 27,000 litres) and 48 light duty vans/cars and buses. A weekly average of 4 heavy duty tankers, 3 medium tankers and 3 light duty vans/cars & buses were burnt by the JTF in Ahoda during the first sixteen weeks of year 2023.

**Table 2 Vehicles burnt by JTF between January and April 2023 at Evwreni Site**

Evwreni Site			
WEEK/YEAR	Heavy duty tanker	Medium tankers/truck	Cars
Week 1 2023	3	4	3
Week 2 2023	5	2	2
Week 3 2023	4	3	3
Week 4 2023	3	1	4
Week 5 2023	2	4	5
Week 6 2023	4	3	3
Week 7 2023	3	2	6
Week 8 2023	6	4	4
Week 9 2023	2	3	1
Week 10 2023	3	2	3
Week 11 2023	4	2	4
Week 12 2023	6	4	5
Week 13 2023	7	0	2
Week 14 2023	3	5	6
Week 15 2023	5	3	4
Week 16 2023	3	2	5
<b>Total</b>	<b>63</b>	<b>44</b>	<b>60</b>



**Figure 2 Vehicles burnt by JTF between January and April 2023 at Ewreni Site.**

While; data presented in Table 2 and Figure 2, showed that between January and April 2023, the JTF also burnt a total of 167 vehicles at

Evwreni site comprising 63 heavy duty tankers (each tankers carrying capacity ranging from 33,000 to 45,000 litres); 44 medium

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tankers/truck (each having carrying capacity ranging from 9,000 to 27,000 litres) and 60 light duty vans/cars and buses. A weekly average of 4 heavy duty tankers, 3 medium tankers and 4 light duty vans/cars and buses were burnt by the JTF in Evwreni between the first week of January and last week of April 2023. At both sites, these vehicles were burnt

together with their contents which are usually petrol, diesel, kerosene, condensate or even crude oil in some instances.

### 3.2: Results of Air Quality Analysis

Air quality data of Ahoda and Evwreni sites are presented in Table 3 and 4 respectively.

**Table 3: Ahoda Site Air Quality Data**

Day of sampling	PM2.5 (ug/m3)	PM10 (ug/m3)	NO2 (ug/m3)	SO2 (ug/m3)	CO (mg/m3)	Ambient Temp (C°)	Relative Humidity (%)
Day 1	165	210	222	289	18.4	31	38
Day 2	175	205	204	250	21.5	30	28
Day 3	250	197	199	207	19.6	32	41
Day 4	180	169	213	234	16.2	29	31
Day 5	267	205	216	223	17.1	31	42
Day 6	172	207	187	257	16.8	30	44
Day 7	185	221	206	317	20.5	29	36
Day 8	211	203	203	240	18.6	30	37
Day 9	237	212	230	208	19.2	32	30
Day 10	209	170	215	217	23.5	29	35
<b>Average</b>	<b>205.1</b>	<b>199.9</b>	<b>209.5</b>	<b>244.2</b>	<b>19.14</b>	<b>30.3</b>	<b>36.2</b>

**Table 4: Evwreni Site Air Quality Data**

Day of sampling	PM2.5 (ug/m3)	PM10 (ug/m3)	NO2 (ug/m3)	SO2 (ug/m3)	CO (mg/m3)	Ambient Temp (C°)	Relative Humidity (%)
Day 1	176	230	222	179	12.8	32	40
Day 2	183	215	234	260	15.4	31	32
Day 3	170	207	219	237	15.6	30	39
Day 4	190	216	223	264	16.3	28	33
Day 5	167	205	236	273	16.2	30	33
Day 6	182	221	207	287	21.7	30	34
Day 7	196	231	216	227	13.5	29	39
Day 8	183	223	223	250	16.6	28	32
Day 9	178	202	230	289	22.7	30	28
Day 10	199	226	235	277	20.5	31	33
<b>Average</b>	<b>217.6</b>	<b>217.6</b>	<b>224.5</b>	<b>254.3</b>	<b>17.13</b>	<b>29.9</b>	<b>34.3</b>

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**Plate.1 Devastated Evwreni site**



**Plate.2 Devastated Evwreni site**



**Plate.3 Truck Set on Fire at Ahoda site by JTF**



**Plate.4 Burning truck at Ahoda site**



**Plate.5 A barge (vessel) being burnt by JTF in Delta State**



**Plate.7 DMI an oil bunkering vessel destroyed by JTF at Sagara (OCT 10, 2022)**



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**Plate. 8** Tura II destroyed by JTF on 11<sup>th</sup> July 2023



**Plate. 9** Burnt Oil Theft Vehicles by JTF



**Plate.10** Oil Theft truck set Ablaze at Agbara Ottor in Delta State

The air quality parameters presented in Table 3, showed that Ahoda site had average values of particulate matter (PM<sub>10</sub> = 205.1 ug/m<sup>3</sup> and PM<sub>2.5</sub> = 199.9 ug/m<sup>3</sup>); NO<sub>2</sub> = 209.5 ug/m<sup>3</sup>; SO<sub>2</sub> = 244.2 ug/m<sup>3</sup>; CO = 19.14 mg/m<sup>3</sup>; average ambient temperature = 30.3 °C; and average relative humidity = 36.2 %. While; The air quality parameters presented in Table 4, showed that Evwreni site had average values of Particulate Matter (PM<sub>10</sub> = 205.1 ug/m<sup>3</sup> and PM<sub>2.5</sub> = 182.4 ug/m<sup>3</sup>); NO<sub>2</sub> = 224.5 ug/m<sup>3</sup>; SO<sub>2</sub> = 254.3 ug/m<sup>3</sup>; CO = 17.13mg/m<sup>3</sup>; average ambient temperature = 29.9°C; and average

relative humidity= 34.3 %. The air quality parameters obtained from Ahoda and Evwreni sites are not within safe range recommended by [17]. The high-level of air quality parameters in Ahoda and Evwreni sites are suggestive of high level of air pollution of the environment which is due to burning of large amount of crude oil and its derivatives; this is supported by the views of Safford et al., [18]. For example [8] reported average particulate matter (PM<sub>2.5</sub>) of 46.3 µg/m<sup>3</sup> for most communities in Nigeria. The average values of PM<sub>2.5</sub> = 199.9 ug/m<sup>3</sup> and PM<sub>2.5</sub> = 182.4 ug/m<sup>3</sup> recorded for Ahoda and Evwreni sites in this study are by far higher than the national average of 46.3 µg/m<sup>3</sup> reported by [8], thereby confirming the negative impact of the burning activities on the surrounding environment.

According to Popa et al., [19], the different products of crude oil/petroleum have their respective burning temperatures: gasoline burns at about 257°C (495 degrees Fahrenheit) at standard atmospheric pressure with heat output of about 120,286 BTUs per gallon; diesel burns at about 900°C to 1200°C at standard atmospheric pressure with heat output of 137,381 BTUs per gallon; kerosene burns at about 575°C at standard atmospheric pressure with heat output of 131,890 BTUs per gallon; and crude oil burns at about 752 °C at standard atmospheric pressure with heat output of 5,691,000 BTUs per barrel. At these burning temperatures plants and animals (flora and fauna) in the surrounding environments are destroyed, according to Yu, *et al.*, [20].

The burning process of large amount of crude oil products by oil facilities in open air spaces as observed in plates 1 to 10 by security agents has high potential to produce toxic substances into the atmosphere. The different components that determine air quality when in excess of the safe range as recorded for the two study areas (Ahoda and Evwreni) are capable causing several problems to human health in the following ways:

When particles of particulate matter are inhaled, they can penetrate deeper into the respiratory system and cause respiratory ailments such as asthma, coughing, sneezing, irritation in the airways, eyes, nose and throat irritation. Studies by Manisalidis et al., [21] have also shown links between exposure to particulate matter and diabetes.

Exposure to high level of carbon monoxide causes carbon monoxide poisoning (interference with oxygen-hemoglobin binding)

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in human beings, chest pain, heart diseases, reduced mental capabilities, vision problems, and contributes to smog formation [22]. Exposure to carbon monoxide can even result to death of victim at very high level of contamination [23].

Nitrogen dioxide poisoning is as much as hazardous as carbon monoxide poisoning. When high concentration Nitrogen dioxide is inhaled, it can cause serious damage to the heart, absorbed by the lungs, inflammation, and irritation of airways [24]. Smog formation and foliage damage are some negative environmental impacts of nitrogen dioxide [25]. Sulfur dioxide is a major cause of haze production, acid rain, damage to foliage, monuments & buildings, reacts and forms particulate matter. In humans, it causes breathing discomfort, asthma, eyes, nose, and throat irritation, inflammation of airways, and heart diseases [26].

Nunez, [27] reported that particulate matter emitted through human activities pollutes the air and coarser dust particles have been found to exert a warming effect. Thus, particulate matter released in the burning of oil vehicles has damaging effects to both the environment and human health in the Niger Delta region. The thick sooty (heavy) smoke resulting from burning tankers and ocean vessels as seen in plates; 4, 5, 7, 8 and 10 which are capable of causing great discomfort to human eyes and difficulty in breathing, stated by [25]. Streams and rivers which are the main source of drinking water for the locals of these areas are polluted by toxic fumes and emissions from the burning of oil vehicles by the security (JTF) operatives, this supported by views of [3]. The thick sooty (heavy) smoke resulting from the burning tankers can also be a huge threat to low altitude aircraft movement which is in the case of helicopters used by oil and gas companies in the Niger-Delta region for their personnel and material logistics operations. Soils of both sites (Ahoda and Ewureni) are also negatively impacted as can be observed in Plates 1, 2 and 9.

On October 10, 2022, at about 3 pm, an oil bunkering vessel named "DMI" with the registration number L85 B9.50 which was allegedly carrying about 650 cubic meters (4088 barrels) of stolen crude oil in five compartments was destroyed by men of the Joint Security Task Force (JTF) at Sagara River near Warri. The JTF men set the ship on fire at Warri River after the ship's skipper, admitted

that the vessel was indeed loaded with stolen crude oil as shown in plate 7. Meanwhile, with the price of crude oil at the world market on October 10, 2022, of \$88.86 per barrel which was the day the vessel was burnt, the Nigeria government lost in economic terms the estimated sum of \$363259.68 (₦157,185,950) being value of crude alone, while that of the vessel itself is worth more in value. This is in addition to the destruction of aquatic/marine resources with attendant pollution of our natural environment. Another vessel caught recently was with 150,000 metric tons of stolen crude oil. The vessel named Tura II, which had a capacity of 500,000 tones with a monetary worth of about \$86,000,000, was intercepted in the wee hours of Saturday being the 8 the day of July, 2023 at Escravos waters in Delta State by a pipeline surveillance and Security firm in Nigeria stealing crude oil from a wellhead. Sadly, the accosted vessel was set ablaze by the JTF in collaboration with the pipeline surveillance team on 11th July, 2023 together with its cargo (allegedly stolen crude oil) as seen in Plate 8 without considering the impact of burning the vessels on human health, water pollution and environment. The estimated monetary loss of the burnt tanker itself "Tura II" runs into several millions of United States Dollars. Another side to the coin is that using a military helicopter to bomb the vessel "Tura II" could have as well resulted in several deaths of fishermen, farmers and other genuine inhabitants of the area who were at risk of being struck by the bombs. This is because such bombs could miss their actual target and hit the wrong targets. This is actually one of the worst and irrational anthropogenic activities witnessed in the oil producing areas of Nigeria in recent times. Hence, there is urgent need for relevant government agencies such as the States and Federal Ministries of Environment as well as other nongovernmental organizations to quickly intervene to save the badly degraded environment from further decay.

#### 4. CONCLUSION

From the study, it is evident that huge economic losses have been incurred by the government of Nigeria through indiscriminate burning down of oil theft vehicles and refining facilities (artisanal refinery) by the JTF in the Niger Delta region. Between January and April 2023 being the study period, several billions of Naira were lost in the burnt vehicles and their contents. Meanwhile, if carefully handled, such

cases of suspected oil thefts could have been presented to courts of competent jurisdiction seeking order of permanent forfeiture of the vehicles, other properties/assets involved and contents (stolen petroleum products) while the government auctions same to generate revenue instead of destroying them by fire which damages our environment and causes injuries to human health. Also from the judicial perspective, it is not proper for the JTF on account of mere suspicion of oil theft through bunkering without adequate investigation and judicial process indulge in the destruction of such assets which can be seen as arson.

The air quality parameters like: particulate matter, NO<sub>2</sub>, SO<sub>2</sub>, and CO recorded in Ahoda and Ewreni sites are suggestive of high level of air pollution of the environment. In this regard, the study concludes that the Niger Delta natural environment, air and water bodies are negatively impacted by this unprofessional act by the JTF. The activities of these security men in recent time have caused huge environmental devastation resulting in adverse impact on aquatic animals, wildlife, forest resource and health of human beings living in the region.

Hence, the following recommendations are made:

- Planting of trees and plants to help to filter the air and remove pollutants.
- Remediation actions should be carried out to correct impacted soils by the activities of the security men.
- The honorable Minister of Environment and other stake holders should stop forthwith the burning of vehicles and assets that are suspected to have been used for oil theft (bunkering) in order to protect our environment from further decay.
- The honorable Minister of Justice and Attorney general of the federation should institute and develop a frame work (judicial process) for the trial, confiscation/forfeiture and auctioning of assets linked to or used for oil theft (bunkering) instead of indiscriminately destroying such assets by fire.
- The Nigerian Bar Association, the honorable Minister of petroleum Resources, Environmental Standards and Monitoring Boards, National Oil Spill Detection and Response Agency (NOSDRA), the respective Ministry of environment, National and affected States houses of assembly, the States Ministries of Health and other

relevant statutory bodies should synergize to see to the speedy end of destroying assets used for oil theft (including vehicles) by burning.

- Lastly, the Federal government of Nigeria should pay adequate compensation to the owners of the parcels of land in different states of the Niger Delta being used by the JTF for continuous burning of vehicles and other assets recovered from suspected oil thieves as well as the host communities.

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